

CLAIMS

The invention claimed is:

1. A sputtering component comprising a sputtering surface, at least 99 atomic% of the sputtering surface consisting of a single phase corresponding to a solid solution of two or more elements in elemental form; each of the two or more elements being selected from groups 1, 5, 6, 8, 9 and 10 of the periodic table.
2. The sputtering component of claim 1 wherein at least 99.9 atomic% of the sputtering surface consists of the single phase.
3. The sputtering component of claim 1 wherein an entirety of the sputtering surface consists of the single phase.
4. The sputtering component of claim 1 as a physical vapor deposition target.
5. The physical vapor deposition target of claim 4 having a total volume, and wherein at least 99 atomic% of the total volume consists of the single phase.
6. The physical vapor deposition target of claim 5 wherein at least 99.9 atomic% of the total volume consists of the single phase.

7. The physical vapor deposition target of claim 5 wherein an entirety of the total volume consists of the single phase.

8. A thin film sputter-deposited from the sputtering component of claim 1.

9. The sputtering component of claim 1 wherein the two or more elements include at least two elements selected from group 1 of the periodic table.

10. The sputtering component of claim 1 wherein the two or more elements are selected only from group 1 of the periodic table.

11. A thin film sputter-deposited from the sputtering component of claim 10.

12. The sputtering component of claim 10 wherein the two or more elements consist of Cs and Rb.

13. The sputtering component of claim 1 wherein the two or more elements include at least two elements selected from group 5 of the periodic table.

14. The sputtering component of claim 1 wherein the two or more elements are selected only from group 5 of the periodic table.

15. A thin film sputter-deposited from the sputtering component of claim 14.

16. The sputtering component of claim 14 wherein each of the two or more elements are selected from the group consisting of Ta, Nb, and V.

17. The sputtering component of claim 1 wherein the two or more elements include at least two elements selected from group 6 of the periodic table.

18. The sputtering component of claim 1 wherein the two or more elements are selected only from group 6 of the periodic table.

19. A thin film sputter-deposited from the sputtering component of claim 18.

20. The sputtering component of claim 1 wherein the two or more elements include at least two elements selected from groups 8, 9 and 10 of the periodic table.

21. The sputtering component of claim 1 wherein the two or more elements are selected only from groups 8, 9 and 10 of the periodic table.
22. A thin film sputter-deposited from the sputtering component of claim 21.
23. The sputtering component of claim 21 wherein the solution is a binary combination selected from the group consisting of Fe/Os, Fe/Ru, Co/Ir, Co/Rh, Ir/Rh, Ni/Pd, Ni/Pt, Co/Ni and Pd/Pt.
24. The sputtering component of claim 1 wherein the solution is Ta/Mo.
25. The sputtering component of claim 1 wherein the solution is Ta/W.
26. The sputtering component of claim 1 wherein the solution is Cr/Fe.
27. A sputtering component comprising a single phase solid solution comprising elemental Cu and elemental Ni.

28. A method of forming a mixed-metal product, comprising electrolytically depositing a mixed-metal product comprising a mixture of a first metal and at least one other metal, the first metal and one or more of the at least one other metal being selected from a groups 1, 5, 6, 8, 9, 10 and 11 of the periodic table; the mixed-metal product being at least 99.95% pure and comprising greater than 0.05% of the at least one other metal.

29. The method of claim 28 wherein the first metal and one or more of the at least one other metal are selected from a common group of the periodic table.

30. The method of claim 29 wherein the first metal and the at least one other metal consist of elements selected from a common group of the periodic table.

31. The method of claim 28 wherein the first metal and one or more of the at least one other metal are selected from groups 8, 9 and 10 of the periodic table.

32. The method of claim 31 wherein the first metal and the at least one other metal consist of elements selected from a groups 8, 9 and 10 of the periodic table.

33. The method of claim 28 wherein the mixture of elements comprises a member of group consisting of Ta/Mo, Ta/W, Cu/Ni and Cr/Fe.

34. A method of forming a mixed-metal product, comprising:
providing a mixture of a first metal and least one other metal in a reaction apparatus with iodine gas and a heated substrate; one or more of the at least one other metal being selected from groups 1, 4, 5, 6, 8, 9, 10 and 11 of elements of the periodic chart as the first metal, wherein the mixture does not comprise Ti or Zr;

reacting the first metal and the at least one other metal with the iodine gas to form a first metal iodide and an iodide of the at least one other metal;

transferring the first metal iodide and the iodide of the at least one other metal to the heated substrate, and utilizing heat from the substrate to decompose the iodides and produce a mixed-metal product comprising the first metal and the at least one other metal; wherein

the mixed-metal product is at least 99.95% pure; and

the mixed-metal product comprises greater than 0.05% of the at least one other metal.

35. The method of claim 34 wherein the first metal and one or more of the at least one other metal are selected from a common group of the periodic table.

36. The method of claim 34 wherein the mixture of elements comprises a member of group consisting of Ta/Mo, Ta/W, Cu/Ni and Cr/Fe.

37. The method of claim 34 wherein the first metal and one or more of the at least one other metal are selected from groups 8, 9 and 10 of the periodic table.

38. A method of forming a mixed-metal product, comprising combining a mixture of a first metal halide and a second metal halide with a reducing agent to produce a mixed-metal product comprising the first and second metals; the first metal and second metals being selected from groups 1, 5, 6, 8, 9 10 and 11 of the periodic table; the mixed-metal product being at least 99.95% pure and comprising greater than 0.05% of the at least one additional metal.

39. The method of claim 38 wherein the first and second metals are selected from a group consisting of Ta/Mo, Ta/W, Cu/Ni and Cr/Fe.

40. The method of claim 38 wherein the first metal and the second metal are selected from a common group of the periodic table.

41. The method of claim 38 wherein the first metal and the second metal are selected from groups 8, 9 and 10 of the periodic table.